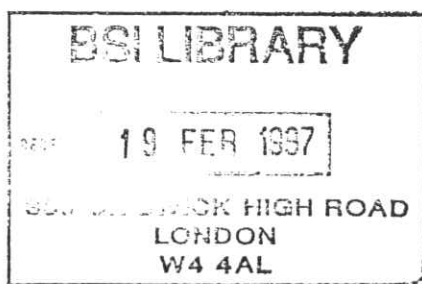


JIS

JAPANESE INDUSTRIAL STANDARD

Piano wire rods

☞ JIS G 3502—1996



Translated and Published

by

Japanese Standards Association

In the event of any doubt arising,
the original Standard in Japanese is to be final authority

Errata for JIS (English edition) are printed in *Standardization Journal*, published monthly by the Japanese Standards Association.

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Errata are also provided to subscribers of JIS (English edition) in *Monthly Information*.



1. Scope This Japanese Industrial Standard specifies piano wire rods (hereafter referred to as "wire rod") to be used for the manufacture of piano wires, oil tempered steel wires, steel wires for prestressed concrete, steel wire strands for prestressed concrete, wire ropes, etc.

Remarks 1. The purchaser may designate Special quality requirements in Annex, in addition to the items specified in this text by preliminary agreement with the manufacturer.

2. The standards cited in this Standard are given in Attached Table 1.

2. Grade and symbol The wire rod shall be classified into 18 categories, and the symbol shall be as given in Table 1.

3. Chemical composition The wire rod shall be tested in accordance with 8.1, and the cast analysis value shall be as given in Table 1.

Table 1. Chemical composition

Unit: %

Symbol of grade	C	Si	Mn	P	S	Cu
SWRS 62 A	0.60 to 0.65	0.12 to 0.32	0.30 to 0.60	0.025 max.	0.025 max.	0.20 max.
SWRS 62 B	0.60 to 0.65	0.12 to 0.32	0.60 to 0.90	0.025 max.	0.025 max.	0.20 max.
SWRS 67 A	0.65 to 0.70	0.12 to 0.32	0.30 to 0.60	0.025 max.	0.025 max.	0.20 max.
SWRS 67 B	0.65 to 0.70	0.12 to 0.32	0.60 to 0.90	0.025 max.	0.025 max.	0.20 max.
SWRS 72 A	0.70 to 0.75	0.12 to 0.32	0.30 to 0.60	0.025 max.	0.025 max.	0.20 max.
SWRS 72 B	0.70 to 0.75	0.12 to 0.32	0.60 to 0.90	0.025 max.	0.025 max.	0.20 max.
SWRS 75 A	0.73 to 0.78	0.12 to 0.32	0.30 to 0.60	0.025 max.	0.025 max.	0.20 max.
SWRS 75 B	0.73 to 0.78	0.12 to 0.32	0.60 to 0.90	0.025 max.	0.025 max.	0.20 max.
SWRS 77 A	0.75 to 0.80	0.12 to 0.32	0.30 to 0.60	0.025 max.	0.025 max.	0.20 max.
SWRS 77 B	0.75 to 0.80	0.12 to 0.32	0.60 to 0.90	0.025 max.	0.025 max.	0.20 max.
SWRS 80 A	0.78 to 0.83	0.12 to 0.32	0.30 to 0.60	0.025 max.	0.025 max.	0.20 max.
SWRS 80 B	0.78 to 0.83	0.12 to 0.32	0.60 to 0.90	0.025 max.	0.025 max.	0.20 max.
SWRS 82 A	0.80 to 0.85	0.12 to 0.32	0.30 to 0.60	0.025 max.	0.025 max.	0.20 max.
SWRS 82 B	0.80 to 0.85	0.12 to 0.32	0.60 to 0.90	0.025 max.	0.025 max.	0.20 max.
SWRS 87 A	0.85 to 0.90	0.12 to 0.32	0.30 to 0.60	0.025 max.	0.025 max.	0.20 max.
SWRS 87 B	0.85 to 0.90	0.12 to 0.32	0.60 to 0.90	0.025 max.	0.025 max.	0.20 max.
SWRS 92 A	0.90 to 0.95	0.12 to 0.32	0.30 to 0.60	0.025 max.	0.025 max.	0.20 max.
SWRS 92 B	0.90 to 0.95	0.12 to 0.32	0.60 to 0.90	0.025 max.	0.025 max.	0.20 max.

4. Physical property

4.1 Decarburized depth The wire rod shall be tested in accordance with 8.2, and the total decarburized depth shall be 0.07 mm or less.

4.2 Austenitic grain size and non-metallic inclusion The purchaser may designate either or both of the austenitic grain size and non-metallic inclusion. According to the designation, either or both of tests specified in 8.3 and 8.4 shall be carried out, and the specified values shall be agreed between the purchaser and supplier.

5. Dimensions The diameter and its tolerances and out-of-round⁽¹⁾ of the wire rod shall be as given in the following:

Note ⁽¹⁾ Out-of-round is the difference between the maximum and minimum values of diameter on the same cross-section of the wire rod.

(1) The standard diameters of the wire rod shall conform to Table 2.

Table 2. Standard diameters

Unit: mm	
5.5, 6, 6.4	7, 8, 9, 9.5 10, 11, 12, 13, 14

(2) The tolerances on diameter and out-of-round of the wire rod shall conform to Table 3.

Table 3. Tolerance and out-of-round

Unit: mm	
Tolerance	Out-of-round
±0.30	0.48 max.

6. Depth of flaw The wire rod shall be tested in accordance with 8.5, and the depth of flaw shall be not more than 0.10 mm.

7. Appearance The wire rod shall be free from any defects that are detrimental to practical use.

8. Test

8.1 Chemical analysis

8.1.1 General requirements for chemical analysis and sampling method of specimen for analysis The chemical composition of the wire rod shall be determined by cast analysis, and general requirements for chemical analysis and sampling method of specimen for analysis shall be as specified in 3. (Chemical composition) of JIS G 0303.

8.1.2 Method for chemical analysis The method for chemical analysis shall conform to one of the following standards:

JIS G 1211, JIS G 1212, JIS G 1213, JIS G 1214, JIS G 1215,
JIS G 1219, JIS G 1253, JIS G 1256, JIS G 1257

8.2 Test on measurement of decarburized depth The test on measurement of decarburized depth shall be as given in the following:

8.2.1 Sampling method of test piece One representative test piece shall be taken from one end of the coil of each lot of the same heat rolled to the same dimension.

8.2.2 Test method The test method shall be in accordance with 4. (Measuring method with microscope) of JIS G 0558.

8.3 Austenitic grain size test The austenitic grain size test shall be performed on request by the purchaser, and the test method shall be as given in the following:

8.3.1 Sampling method of test piece The sampling method of the test piece shall be agreed between the purchaser and supplier.

8.3.2 Test method The test method shall be in accordance with JIS G 0551. With this respect, selection of applicable method out of those specified in this Standard shall be agreed between the purchaser and supplier.

8.4 Non-metallic inclusion test The non-metallic inclusion test shall be performed on request by the purchaser, and the test method shall be as given in the following:

8.4.1 Sampling method of test piece The sampling method of the test piece shall be agreed between the purchaser and supplier.

8.4.2 Test method The test method shall be in accordance with JIS G 0555.

8.5 Flaw detection test The flaw detection test shall be as given in the following. However, in the case where the mutual relationship between the flaw depth, detectivity, etc. is known, a some alternative method such as the magnetic particle testing may be applied.

8.5.1 Sampling method of test piece Everyone representative test piece shall be taken from both ends of the coil of each lot of the same heat rolled to the same dimension.

8.5.2 Test method As to the test method, the flaw depth shall be determined when the test piece is immersed for 30 minutes in the corroding solution⁽²⁾ composed of about 3 volumes of hydrochloric acid specified in JIS K 1310 and about 7 volumes of water of which the solution is in boiling state. As a rule, a fresh corroding solution shall be used every time.

Note ⁽²⁾ The volume (ml) of the corroding solution shall be not less than the value obtained by multiplication of the surface area (cm²) of the test piece by 0.7.

9. Inspection The inspection shall be as given in the following:

- (1) General requirements for inspection shall conform to JIS G 0303.
- (2) The chemical composition shall conform to the requirements of 3.
- (3) The decarburized depth shall conform to the requirements of 4.1.
- (4) The austenitic grain size shall conform to the requirements of 4.2.
- (5) The non-metallic inclusion shall conform to the requirements of 4.2.
- (6) The dimensions shall conform to the requirements of 5.
- (7) The flaw depth shall conform to the requirements of 6.
- (8) The appearance shall conform to the requirements of 7.
- (9) When "Special quality requirements" in Annex is designated to apply by agreement between the purchaser and supplier, the wire rod shall conform to the requirements of 1. of Annex.

10. Marking The wire rods having passed the inspection shall be marked on each coil with the following particulars by suitable means. However, when approved by the purchaser, a part of them may be omitted.

- (1) Symbol of grade
- (2) Heat number or inspection number
- (3) Diameter of the wire rod
- (4) Manufacturer's name or identifying brand

11. Report The manufacturer shall submit the purchaser the test results on the specified items when so requested by the purchaser.

Attached Table 1. Cited standards

JIS G 0303	General rules for inspection of steel
JIS G 0551	Methods of austenite grain size test for steel
JIS G 0555	Microscopic testing method for the non-metallic inclusions in steel
JIS G 0558	Methods of measuring decarburized depth for steel
JIS G 1211	Iron and steel—Methods for determination of carbon content
JIS G 1212	Methods for determination of silicon in iron and steel
JIS G 1213	Methods for determination of manganese in iron and steel
JIS G 1214	Methods for determination of phosphorus in iron and steel
JIS G 1215	Iron and steel—Methods for determination of sulfur content
JIS G 1219	Methods for determination of copper in iron and steel
JIS G 1253	Iron and steel—Method for spark discharge atomic emission spectrometric analysis
JIS G 1256	Method for X-ray fluorescence spectrometric analysis of iron and steel
JIS G 1257	Iron and steel—Methods for atomic absorption spectrometric analysis
JIS K 1310	Hydrochloric acid

Annex Special quality requirements

This Special quality requirements (including the marking system used at the time of application) shall be applied by agreement between the purchaser and supplier, and it shall be performed by the manufacturer.

1. Chemical composition When agreed between the purchaser and supplier, the purchaser may designate the following content:

P: 0.015 % max.

S: 0.015 % max.

G 3502-1996
Edition 1

Japanese Text

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